

**REMARKS**

Applicant respectfully requests reconsideration and allowance of claims 6-7, 12-14, and 19-21, which are pending in the above-identified application. Claims 1-18 stand rejected. Applicant has canceled claims 1-5, 8-11, and 15-18, has amended claims 6, 12, and 14, and has added new claims 19-21 herein. No new matter is added by the amendments herein. Support for the amendments is found in FIGS. 1-3 and paragraphs [0041-0043] of the specification of the instant application as originally filed. In view of the following discussion, Applicant submits that all pending claims are in condition for allowance.

**Claim Objection:**

At page 2 of the Office Action, the Examiner has objected to claim 13 under 37 C.F.R. §1.75(c) as allegedly being in improper form as a multiple dependent claim depending on another multiple dependent claim. Applicant respectfully disagrees with the Examiner. Applicant amended claim 12 from a multiple dependent claim into a singularly dependent claim in Applicant's August 18, 2006 preliminary amendment. Applicant submits that claim 13 is a singularly dependent claim depending from claim 12, which is another singularly dependent claim 12. As such, Applicant submits that the Examiner's claim objection has been overcome, and respectfully requests that the Examiner's claim objection be withdrawn to address claim 13 on the merits.

**Claim Rejections under 35 U.S.C. §103:**

At page 2 of the Office Action, the Examiner has rejected claims 6-9, and 16-17 under 35 U.S.C. §103(a) as being unpatentable over Guha et al. (U.S. Pat. Pub. No. 2005/0094706, hereinafter referred to as "Guha") in view of Bowden et al. (U.S. Pat. No. 7,296,928, hereinafter referred to as "Bowden"). In view of the amendments herein, Applicant respectfully traverses the Examiner's rejection.

Amended independent claim 6 recites, in part, “a heat control apparatus for a circuit, comprising: a transparent cooling mechanism tightly secured to a semiconductor integrated circuit, the transparent cooling mechanism having a hollow part;...and a driving mechanism for causing a coolant to flow in the hollow part of the transparent cooling mechanism, wherein the hollow part is provided so as not to overlap the semiconductor integrated circuit.” (Emphasis added.)

Guha does not disclose or suggest a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in amended independent claim 6 of the instant application. Guha discloses that the alleged hollow part (*i.e.*, duct 805) completely overlaps the electronic device or chip 101 so that an image is captured through the fluid 806, which is used to cool the electronic device 101. (See FIG. 8; and paragraph [0055].)

Because Bowden lacks a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in claim 6, Bowden does not cure the aforementioned deficiencies of Guha.

In contrast, independent claim 6 requires a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit. By way of example, embodiments of independent claim 6 may include an infrared camera 24 for taking an image of a processor 18 through a hollow glass plate 20, and may include a fine passage 22 having a coolant passage 70 such that the coolant is not located between the die 16 of the processor 18, which is subject to observation, and the infrared camera 24. The coolant passage 70 does not overlap the semiconductor integrated circuit (*i.e.*, processor 18). (See FIGS. 1-3; and paragraphs [0041-0043] of the specification of the instant application.) As a result, the following advantages are obtained:

- (i) Accordingly, the coolant itself may be nontransparent. The flexibility allowed in the choice is extensive. Water is used widely as a coolant due to its ease of handling. While water is not completely transparent in the infrared zone, it can be used in the second embodiment without any problems. (paragraph [0043] of the specification); and
- (ii) Since the coolant does not affect temperature measurement by the infrared camera 24 according to the second embodiment, correction for interposition of the coolant is not necessary. Therefore, the temperature distribution of the

die 16 can be measured with a high precision. (Paragraph [0043] of the specification.)

Because Guha teaches the opposite, where the alleged hollow part (*i.e.*, duct 805) completely overlaps the electronic device or chip 101 so that an image is captured through the fluid 806, and because Bowden does not cure the aforementioned deficiencies of Guha, the teachings of Guha and Bowden, alone or in combination, do not result in the invention of claim 6. Therefore, claim 6 is patentable. As claim 7 depends from claim 6, and recites additional patentable features, the subject dependent claim is, therefore, likewise patentable.

At page 3 of the Office Action, the Examiner has rejected claims 6-8 under 35 U.S.C. §103(a) as being unpatentable over Wu (U.S. Pat. No. 6,162,659) in view of Quintard (U.S. Pat. No. 5,208,528). In view of the amendments herein, Applicant respectfully traverses the Examiner's rejection.

The Examiner alleges that Wu discloses a silicon heat spreader 21 that is transparent. Applicant respectfully disagrees with the Examiner.

Wu does not disclose or suggest a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in amended independent claim 6 of the instant application. Wu merely discloses that the heat spreader 21 has a silicon layer 22 and an adhesion-promotion layer 23 that completely overlaps the chip 13. Wu is silent on the heat spreader 21 being transparent. On the contrary, Wu teaches that the adhesion-promotion layer 23 of the heat spreader 21 is not transparent because the layer 23 may be made of Cr-Cu-Au. (See col. 3, lines 2-15; and FIGS. 1-3.)

Because Quintard lacks a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in claim 6, Quintard does not cure the aforementioned deficiencies of Wu. Quintard teaches the opposite of what is claimed because the infrared camera 36 only takes an image of the board 26 when the board 26 is moved in front of the camera 36 in an area without a cooling mechanism. (See FIG. 3; and col. 8, lines 23-45). Assuming for the sake of argument that ambient air cools the board 26 during a cooling process (which

Applicant does not concede), the ambient air is not a cooling mechanism as claimed because ambient air does not have a hollow part so as to not overlap the semiconductor integrated circuit. Indeed, the ambient air around board 26 is located between the board 26 and the camera 36 such that the camera 36 would have to take an image through the ambient air.

In view of the above, the teachings of Wu and Quintard, alone or in combination, do not result in the invention as recited in claim 6 of the instant application. Therefore, claim 6 is patentable. As claim 7 depends from claim 6, and recites additional patentable features, the subject dependent claim is, therefore, likewise patentable.

At page 4 of the Office Action, the Examiner has rejected claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over Quintard. In view of the cancellation of claims 1-3 herein, Applicant submits that the Examiner's §103 claim rejection of the subject claims is moot.

At page 5 of the Office Action, the Examiner has rejected claims 1-4, and 16-17 under 35 U.S.C. §103(a) as being unpatentable over Lloyd (U.S. Pat. No. 3,868,508) in view of Bowden. In view of the cancellation of claims 1-4, and 16-17 herein, Applicant submits that the Examiner's §103 claim rejection of the subject claims is moot.

Additionally, for the sake of argument, Applicant notes that Lloyd fails to disclose or suggest a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in claim 6. As such, Lloyd does not cure the aforementioned deficiencies of the cited prior art.

At page 5 of the Office Action, the Examiner has rejected claims 1-5, and 16-17 under 35 U.S.C. §103(a) as being unpatentable over Rosengaus (U.S. Pat. No. 5,653,539) in view of Bowden. In view of the cancellation of claims 1-5, and 16-17 herein, Applicant submits that the Examiner's §103 claim rejection of the subject claims is moot.

Additionally, for the sake of argument, Applicant notes that Rosengaus fails to disclose or suggest a transparent cooling mechanism having a hollow part so as not to overlap the

semiconductor integrated circuit as recited in claim 6. As such, Rosengaus does not cure the aforementioned deficiencies of the cited prior art.

At page 6 of the Office Action, the Examiner has rejected claims 9-12, 14-15, and 18 under 35 U.S.C. §103(a) as being unpatentable over Guha in view of Bowden in further view of Fujisaki et al. (U.S. Pat. No. 5,763,950, hereinafter referred to as “Fujisaki”). In view of the amendments herein, Applicant respectfully traverses the Examiner’s rejection.

The reasons for patentability of amended independent claim 6 over the teachings of Guha and Bowden, alone or in combination, as discussed above apply with equal weight here. Because Fujisaki lacks a transparent cooling mechanism having a hollow part so as not to overlap the semiconductor integrated circuit as recited in claim 6, Fujisaki does not cure the aforementioned deficiencies of Guha and Bowden. As such, the teachings of Guha, Bowden, and Fujisaki, alone or in combination, do not result in the invention as recited in claim 6. As claims 12 and 14 depend from claim 6, and recite additional patentable features, the subject dependent claims are, therefore, patentable.

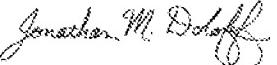
In view of the above, Applicant respectfully requests that the Examiner’s §103 claim rejections be withdrawn.

**Conclusion:**

In view of the foregoing, Applicant submits that the instant claims are in condition for allowance. Early and favorable action is earnestly solicited. The fee for the petition is included herewith. In the event there are any further fees due and owing in connection with this matter, please charge same to our Deposit Account No. 11-0223.

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Respectfully submitted,

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